PROSPECTIVE INTEGRATED ASSESSMENT OF CANCER RISK ATTRIBUTABLE TO PESTICIDES IN EUROPE

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Background and Aims: The main climate change policy expected to influence agricultural patterns and, consequently, the need for pesticide use in Europe is the introduction of bio-energy in the domestic energy production mix. Over the next 40 years this will depend on land availability and the need to curb C emissions. Two different scenarios for climate change up to 2050 (a BAU based on 2000 trends and an aggressive emissions abatement scenario limiting temperature change to 2 C) have been assumed.
Methods: The changes in agricultural land use patterns and productivity have been estimated combining CORINE land cover/use data, Eurostat agricultural statistics and the IMAGE and ATEAM models to account for climate change impact on agriculture. The result was mapped on a 50x50 km grid. Using Monte Carlo the changes in land use were distributed stochastically within the grid cells. The areas dedicated to energy crops were calculated taking into account the current state of knowledge regarding yield and the energy demand assumed to be fulfilled by energy crops by the TIMES energy-economic model.
Results: Pesticide use maps were prepared at the same resolution and aggregated at the country level accounting for the spatial allocation of agricultural land for food and energy production. Gradual substitution of active substances with less toxic ones was modeled based on the last twenty years trend and the current regulatory framework. Dietary, inhalation and dermal intake were considered. For inhalation, both long-range transport of pesticides and short-distance exposure due to direct application were accounted for.
Conclusions: Results showed that dietary ingestion is the main route of exposure to pesticides; short-distance inhalation exposure affects primarily farm workers and bystanders. Thus, spatial cancer risk analysis has been undertaken at a finer (100x100 m) resolution, showing significant variations across Europe even within agricultural areas of the same country.